

We claim:

1. A process for preparing a nickel(0)-phosphorus ligand complex containing at least one nickel(0) central atom and at least one phosphorus ligand, which comprises reducing a nickel(II) source comprising nickel bromide, nickel iodide or mixtures thereof in the presence of at least one phosphorus ligand.
- 5 2. A process as claimed in claim 1, which is carried out in a solvent which is selected from the group consisting of organic nitriles, aromatic or aliphatic hydrocarbons and mixtures thereof.
- 10 3. A process as claimed in claim 1 or 2, wherein the concentration of the phosphorus ligand in the solvent is from 1 to 90% by weight, based on the solution.
- 15 4. A process as claimed in any of claims 1 to 3, wherein the reducing agents used are metals which are more electropositive than nickel.
5. A process as claimed in any of claims 1 to 3, wherein the reducing agents used are metal alkyls, electrical current, complex hydrides and hydrogen.
- 20 6. A process as claimed in any of claims 1 to 5, wherein the ligands are selected from the group consisting of phosphines, phosphites, phosphinites and phosphonites.
- 25 7. A process as claimed in claim 6, wherein the ligand is bidentate.
8. A process as claimed in any of claims 1 to 7, wherein the phosphorus ligand stems from a ligand solution which has already been used as a catalyst solution in hydrocyanation reactions.
- 30 9. A process as claimed in any of claims 1 to 8, which comprises the following process steps:
 - 35 (I) preparing a solution of suspension of nickel bromide, nickel iodide or a mixture thereof in a solvent under inert gas,
 - (II) stirring the solution or suspension stemming from process step (I) at a precomplexation temperature of from 20 to 120°C and for a precomplexation period of from 1 to 24 hours,
- 40

- (III) adding at least one reducing agent to the solution or suspension stemming from process step (II) at an addition temperature of from 20 to 120°C.
 - 5 (IV) stirring the suspension or solution from process step (III) for a reaction period of from 20 minutes to 24 hours at a reaction temperature of from 20 to 120°C.
- 10 10. A mixture comprising a nickel(0)-phosphorus ligand complex, obtainable by a process as claimed in any of claims 1 to 9.
11. The use of the mixtures comprising nickel(0)-phosphorus ligand complexes as claimed in claim 10 in the hydrocyanation and isomerization of alkenes and in the hydrocyanation and isomerization of unsaturated nitriles.